Evolution do-over might lead to the same place

In the world of science fiction, the ‘what ifs’ of evolution make great plot fodder. Think of Planet of the Apes, where on a planet other than our own primates evolved to be the intelligent masters of their environment while humans remained primitive.

In real life, it’s a bit harder to answer the question. If evolution happened all over again, what would life on Earth be like? Would it still be carbon-based? What organisms would flourish? Would the same organisms even exist?

To test these ideas, Harvard physicist turned biologist Michael Desai uses robots and yeast. He grows hundreds of yeast colonies under different but rigorously controlled conditions, picks out the fastest replicating ones and follows them for hundreds of generations. The different growth environments essentially represent different worlds.

These colonies all naturally start off with a bunch of random, different mutations. Some biologist theorize creates the potential for many different types of yeast colonies at the end of the experiment.

But Desai hasn’t found that. No matter what the initial mutations were in the yeast, they all ended up able to live in very similar conditions, at the same evolutionary endpoint.

This might have profound impacts on how we think about single mutations and the fitness of an organism overall and the fitness of populations of organisms writes Emily Singer at Quanta:

> The findings also suggest a disconnect between evolution at the genetic level and at the level of the whole organism. Genetic mutations occur mostly at random, yet the sum of these aimless changes somehow creates a predictable pattern. The distinction could prove valuable, as much genetics research has focused on the impact of mutations in individual genes. For example, researchers often ask how a single mutation might affect a microbe’s tolerance for toxins, or a human’s risk for a disease. But if Desai’s findings hold true in other organisms, they could suggest that it’s equally important to examine how large numbers of individual genetic changes work in concert over time.

Because the study involves only yeast, a one celled organism, we can’t be sure it applies to others. But the idea that life, at least on this planet, would remain largely the same even if we started out all over again has some profound ideological implications.

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Additional Resources:

- Clocks versus rocks: Genetics and the origin of placental mammals, Genetic Literacy Project
- Life: Digital and Synthetic?, Biopolitical Times